Chapter Two ALTERNATIVES

As described in Chapter One, the Proposed Action considered in this EA is the reconfiguration of the airspace system above and beyond the Cleveland and Detroit Metropolitan Areas in accordance with the MASE airspace redesign. This involves changes to ingress and egress routes and fixes, altitude use, holding patterns, as well as development of new procedures in both the high-altitude multi-center en route and the low-altitude terminal airspace environments. MASE would provide for more efficient management of aircraft using the new runways at DTW and CLE, address inefficiencies in terminal airspace routings, and allow greater flexibility and efficiency in the high altitude airspace structure.

Federal guidelines concerning the environmental review process require that prudent, feasible, reasonable, and practical alternatives that might accomplish the Purpose and Need for Federal action be rigorously explored and objectively evaluated. This chapter documents the narrowing process used to consider potential and reasonable alternatives, including their identification and ability to meet the Purpose and Need.

2.1 IDENTIFICATION OF POTENTIAL ALTERNATIVES

This section identifies potential alternatives that that might accomplish the Purpose and Need for Federal action. In order to merit further consideration, it is necessary that potential alternatives increase air traffic efficiency, enhance safety, mitigate delay, and accommodate growth in the study area airspace. The assessment of potential alternatives documents the reasons for elimination of a particular alternative if it is found to be infeasible and therefore unreasonable. The following types of potential alternatives are considered:

- Use of Satellite Airports - shift operations from primary, congested airports to un-congested satellite airports;
- Air Travel Demand Management - regulate air travel demand to limit flight operations to a level below the saturation level of the airspace structure;
- Improved ATC Technology - use of new technologies to improve the efficiency of the airspace; and
- Airspace Redesign Alternatives – use of restructured airspace routes, altitudes, and sectors to route aircraft to and from area airports.

2.2 EVALUATION OF ALTERNATIVES

Each potential alternative was analyzed for its ability to meet the Purpose and Need for Federal action. This section explains the reasons why a particular alternative was eliminated or carried forward for additional analyses.

2.2.1 Alternatives Eliminated

The following alternatives were eliminated from further consideration as they do not meet the Purpose and Need for Federal action.

2.2.1.1 Use of Satellite Airports

With this alternative, operations would be shifted from congested airports to nearby satellite airports. An example would be an alternative designed to shift operations at DTW to lesser used facilities such as FNT, TOL, YIP, and DET.

One problem with this type of alternative is that regardless of the departure/arrival airport, flights traveling to or from major metropolitan areas will still be using the same flight routes to traverse the existing en route and terminal airspace structure. ATC would still need to manage aircraft using inefficient routes. As a result, shifting aircraft activity from highly used airports to lesser used airports may still cause flights to incur airspace delays and thus would have a negligible benefit to airspace efficiency.

Another problem with this type of alternative is that use of an airport is determined by aircraft operators and not the FAA. Aircraft operators choose to serve an airport in response to consumer demand for air service. No regulatory mechanism exists for the FAA to redistribute air traffic to satellite airports in the Study Area. Federal legislation would be needed in order to give the FAA the necessary authority to redistribute air traffic, which would represent a fundamental change to the nation's policy of a deregulated aviation system. Such legislation is not likely to be enacted in the current deregulatory environment.

Based upon this assessment, use of satellite airports would not address the Purpose and Need for Federal action, since this traffic would still be required to operate into and out of the current terminal and en route airspace structure. Therefore, use of satellite airports is not considered to be a reasonable alternative for meeting the Purpose and Need and will not be carried forward for further consideration.

2.2.1.2 Air Travel Congestion Management

Air traffic congestion management programs include regulatory and/or economic measures to manage the number of flight operations during peak use periods, potentially limiting the number of operations or shifting them to other less congested times of the day. The primary objective of air travel congestion management is to increase the efficiency of existing airport facilities.

Today, regulatory mechanisms are used to limit the number of flight operations at certain airports in the Study Area. The FAA's High Density Rule (HDR), originally implemented in 1968, currently requires operations at Washington DC's Ronald Reagan Washington National Airport (DCA) and New York's Kennedy (JFK) and LaGuardia (LGA) Airports to have a slot (i.e., a takeoff or landing reservation). While the slot system does effectively manage aircraft congestion, it also restricts airline competition as airlines have ownership of the existing slots and are reluctant to sell them to competitors.

The FAA also operates a "flow control" system to reduce congestion and en route delay by holding aircraft on the ground at their departure airports until there is sufficient capacity in the airspace system and at their destination airports to allow the aircraft to proceed with minimum in-flight delay. While this system is effective in limiting in-flight delay and avoiding saturation of the airspace system, it does induce considerable delays on the ground for departing aircraft. The flow control system is intended to manage the amount of aircraft operating at a given time by delaying flights;

it does not provide for an overall reduction in aircraft activity as the ultimate decision on canceling a flight is that of the airline.

Air travel congestion management programs could be applied to the entire Environmental Study Area airspace structure using a variety of regulatory or economic mechanisms, some of which are described in the following paragraphs.

Airlines could be required to modify their schedules to shift operations from peak use periods to less congested periods, in line with available capacity. This could be accomplished, for example, by expansion of HDR to airports in the Environmental Study Area. The slots could be allocated by lottery to airlines or sold via an auction.

Similarly, peak-period pricing could be used to encourage airlines to shift operations from peak use periods to less congested periods. Prices for airport access would be higher during periods of heavy demand to discourage use during that period. At the same time, the pricing creates an incentive to use a facility at off-peak times. From an economic perspective, this can provide an efficient allocation of scarce resources. Aircraft operators that most critically need airport access, and are willing to pay for it, would be the ones to use the facility during peak periods. Airport landing fees, passenger ticket taxes, and/or airspace user fees could incorporate peak-period pricing mechanisms.

Airlines could be required to serve the Environmental Study Area airports using larger aircraft with more seats. Today, many flights in the Environmental Study Area are conducted using regional jet aircraft with a maximum of about 70 seats. A typical Boeing 737 or Airbus A320, however, has 135 to 150 seats. Assuming a constant level of demand, larger aircraft could be used to transport the same number of people with fewer flights.

These air travel congestion management programs could serve to limit the number of flights that operate in the Environmental Study Area airspace and thus potentially reduce congestion and delay. The programs could be implemented as a stand-alone measure or as a combination of measures. For example, an expanded HDR could include requirements for larger aircraft sizes for specific slots.

In the deregulated market, demand for air service is dynamic and dependent on flight availability, schedule, and ticket price. Air travel congestion management programs would have economic consequences on the aviation industry and the traveling public. Congestion pricing (e.g., peak-hour pricing) or an auction for a slot lottery could increase ticket prices, and a policy decision would need to be made on how to spend the extra revenue beyond that needed for the aviation system. The higher fees could price some airlines out of certain markets.

Also, airline schedules and service could be constrained as a result of the flight reductions. For example, an expanded slot system and/or a requirement for larger aircraft could limit direct service from certain communities to airports in the Study Area. Passengers traveling from these communities to the Study Area would then need to connect through hub airports. The slot system could also limit the available service between certain communities. For many smaller communities, non-stop service to business locations such as New York City (at convenient times) is an important component in their ability to attract and keep local enterprises.

Moreover, recent events at LGA and Chicago O'Hare International Airport

(ORD) highlight the challenges with the policy decisions inherent in air travel congestion management programs. The Aviation Investment and Reform Act for the 21st Century (AIR-21) provided for the elimination of the slot rules at ORD in January 2002 and JFK and LGA by January 2007. AIR-21 also included interim exemptions to the slot rules for regional jets having 70 seats or less that provided service to small or medium sized non-hub airports, if operated by limited incumbent carriers (airlines then having less than 20 slots at LGA) and new entrant carriers.

As a result of the new flights operating under the slot exemptions, massive delays occurred at LGA in 2000. Due to these delays the Port Authority of NY and NJ announced a moratorium on additional flights at LGA in September 2000. The FAA then announced that it was reinstituting slot restrictions (using its authority for safety and the efficient movement of air traffic), and that it would conduct a slot lottery to redistribute a set number of daily exemptions. Effectively, the FAA limited operations at LGA to 75 per hour as a reasonable hourly demand level for airport facilities and ATC. The FAA and Port Authority of New York and New Jersey (PANYNJ) continue to analyze regulatory and economic measures to manage demand levels at LGA.[1] As the slot exemptions were enacted in AIR-21 to increase airline competition and direct service to smaller communities, it does not seem likely that Congress would pass air travel congestion management policies that would indirectly reduce airline competition or service to small communities.

At ORD, American Airlines and United Airlines added a substantial number of new flights following the end of the slot rules in January 2002. Delays increased substantially during 2003. As a result, in early 2004, American and United Airlines voluntarily reduced flights at ORD and the FAA then issued orders making the reductions mandatory. The FAA later convened a schedule reduction meeting with all the airlines serving ORD and negotiated further schedule reductions and changes to flight times in order to reduce delays at the airport and to reduce induced systemic delays throughout the National Airspace System (NAS, the System). These actions were then incorporated into another FAA order.[2]

The legal authority to implement air travel congestion management programs is complex. In AIR-21, Congress emphasized that the end of the slot rules was not intended to affect the FAA's overall authority for the management of the airspace for the safe and efficient movement of aircraft.[3] The FAA used this authority for the slot actions and schedule reductions at LGA and ORD. FAA described the schedule reductions at ORD as “a highly unusual situation, one that is unlikely to be replicated.”[4] Moreover, these legal mechanisms apply to operations at specific airports and not the whole of the NY/NJ/PHL Metropolitan Area. The FAA does not have the legal authority to implement air travel congestion management programs for the entire MASE Study Area. Congress would need to grant the FAA this authority.

The economic consequences of the air travel congestion management programs are not directly within the scope of this EA. Policy decisions that would need to be made by the Federal government (both Congress and FAA) to implement these measures involve significant economic and political trade-offs between multiple stakeholders (e.g., small communities, large communities, airlines, general aviation, etc.). For example, the political interests of small communities are unlikely to be satisfied by restrictive congestion management programs. Given the stakes involved in these policy decisions, it is unlikely that the political consensus needed to pass legislation and promulgate the implemented regulations is likely to be achieved in the foreseeable future.

While air travel congestion management programs could serve to reduce delays, they would not serve to accommodate growth. Also, air travel congestion management cannot be implemented under existing law and policy. Based upon this assessment, congestion management alone is not considered to be a reasonable alternative for meeting the Purpose and Need for Federal action and will not be carried forward for detailed environmental analysis.

2.2.1.3 Improved Air Traffic Control Technology

Several technologies currently under development by the FAA, as part of the agency's Operational Evolution Plan (OEP) and Free Flight Program, offer the potential to increase the efficiency of the NAS.

While the potential exists for these technologies to allow controllers to better manage the airspace, they will not by themselves accommodate growth and enhance the safety and efficiency of the system. The inherent limitations of the existing airspace design, route structure, and ATC procedures would continue to exist. Technological improvements offer the potential to complement the Proposed Action by providing the tools needed by controllers to more efficiently manage the flow of traffic. That both new technologies and the Airspace Management Program (AMP) are included in the FAA's Operational Evolution Plan (OEP) is indicative of the need for revised airspace routings that allow new technologies to be fully used.[5] Improved ATC technologies are dependent on a flexible and relatively unconstrained airspace structure that does not currently exist. ATC technology as a stand-alone alternative will not meet the Purpose and Need for Federal action and is therefore not considered further.

2.2.1.4 Airspace Redesign Alternatives Eliminated from Consideration

The number of viable airspace redesign alternatives associated with an ATC project is always very limited in number. This is because changes made in one airspace area often cause adverse domino effect changes to surrounding airspace areas, possibly leading to the requirement for nationwide changes. As such, airspace redesign teams are limited in the scope of alternatives available to them. They must seek to solve inefficiencies within their area of responsibility without negatively affecting adjacent airspace which could then bring about far-reaching airspace changes. The MASE airspace design team decided to advocate the Proposed Action only after it had considered numerous design iterations over a period of several years. The design iterations required coordination between ATC specialists at CLE, D21, and ZOB, as well as with other centers to ensure that the overall design could be implemented without causing unintended and/or unworkable consequences in the high-altitude en route airspace.

The design process took place over several years and could not involve the development of several wholly integrated separate airspace alternatives. Rather, the airspace team evaluated individual redesign initiatives to correct inefficiencies in specific areas of concern in terminal and center airspace to determine if they would meet project goals. If the evaluation revealed that a particular redesign initiative would fail to achieve its intended goal or created unacceptable consequences in another airspace area, the initiative was dropped and alternative redesign scenarios were pursued. This iterative process involved the assessment of numerous redesign scenarios. The experience gained through the iterative process proved invaluable to the airspace team in designing new airspace scenarios that avoided these deficiencies.

As an example, one of the initial redesign concepts considered by the airspace team was to improve efficiency for aircraft inbound to DTW from the southwest over the MIZAR fix (located in the vicinity of Adrian, MI in Lenawee County). With increased runway capacity at DTW afforded by runway construction completed in 2001, the airspace team sought to increase terminal and en route efficiency to match this new airfield capacity by implementing a dual arrival fix near the existing MIZAR fix.

The existing routes from ZAU and ZID that feed the MIZAR fix serve a high volume of traffic, often resulting in aircraft delay. The airspace team, however, discovered that creation of a second arrival fix would require the redesign of all arrival and departure fixes on the western periphery of D21 terminal airspace. Because the benefits associated with implementation of dual arrival fixes to the southwest outweighed their potential benefits, this design initiative was dropped and other options were pursued. Over the course of the design process, this vetting process occurred over and over again until the final MASE Airspace Redesign alternative was developed.

This particular example illustrates that while only a single final MASE Airspace Redesign alternative was put forth for implementation, there were numerous design alternatives considered and rejected based on their relative merits to improve airspace efficiency.

2.2.2 Airspace Redesign Alternatives Carried Forward for Environmental Evaluation

The No Action Alternative is carried forward as required by NEPA and CEQ regulations. The Proposed Action is also carried forward as it is the only alternative that meets the Purpose and Need without creating unacceptable consequences in other airspace areas. Section 2.3 provides a comparison of the No Action Alternative to the Proposed Action Alternative.

For both the No Action and Proposed Action alternatives, a number of common elements are included in the airspace modeling design assumptions. These common design elements include:

- Continued Use of Local Noise Abatement Procedures;
- Implementation of Localized Descent Approach Procedures at CLE;
- Use of North/South Flows at CLE and DTW; and
- Use of the existing DTW runway configuration and implementation of the CLE approved runway layout.

2.2.2.1 Noise Abatement Procedures

The existing noise abatement procedures in effect at CLE and DTW would continue to be used with both the No Action and the Proposed Action alternatives.

Additionally, the basic aircraft flight patterns in the vicinity of both airports would not change with either the No Action

Alternative or the Proposed Action Alternative.

2.2.2.2 Implementation of Localized Descent Approach Procedures at CLE

Use of Localized Descent Approach procedures at CLE are included in both the No Action and the Proposed Action alternatives. Offset approaches (i.e., an approach path offset 3 degrees from the extended runway centerline) to Runway 06R/24L, beginning 15 miles from the runway threshold are assumed. A standard 3 degree approach descent angle is also used. For the amount of time the offset procedure would be typically used, the procedure was modeled using the Simultaneous Offset Instrument Approach (SOIA) separation standards for 75% of the time, while 25% of the time a visual separation standard was assumed. Note that this differs slightly from what was modeled in the 2000 CLE FEIS, as the visual procedure was not available when the FEIS was developed and subsequently completed.

2.2.2.3 Use of Northeast/Southwest Flow at CLE and DTW

ATC establishes runway use configurations (or flows) to maximize the safe, orderly and expeditious flow of air traffic into and out of an airport. Runway flows are established so that aircraft generally takeoff and land in the same direction; this increases both airport capacity and safety. Thus, runway flows are based on the physical orientation of runways. Aircraft must generally depart (i.e., takeoff) and arrive (i.e., land) into the wind to increase aircraft performance and maintain safety. Runway use is generally determined by wind but can also be affected by other factors including weather, operational efficiency, runway capabilities (e.g., length), and in some instances airport requirements related to operations, noise, and maintenance.

ATC primarily uses city pairs (i.e., the arrival and destination airport for a specific flight) and aircraft type to assign an aircraft to a specific runway, given favorable wind conditions. A particular arrival or departure city pair typically translates to a routing via a specific arrival or departure fix that is geographically proximate to the active arrival or departure runway being used.

As described in **Appendix I**, both the No Action Alternative and Proposed Action Alternative runway use assumptions for CLE and DTW were developed through coordination with CLE and DTW/D21 ATC personnel, respectively, and ZOB. The analysis was based on assessment of current radar data, assessment of forecast operations, and validation by ATC on how the airports would operate in the future.

DTW operates in a northeast flow (i.e., Runways 04L, 04R, 03L and 03R) approximately 43% of the time, southwest flow (i.e., Runways 22R, 22L, 21R and 21L) for approximately 56% of the time, and on the east-west crosswind runways (i.e., Runways 09R/27L and/or 09L/27R) the remaining 1% of the time. At CLE, northeast flow (i.e., Runways 06L and 06R) occurs about 40% of the time, southwest flow (i.e. Runways 24L and 24R) occurs about 59% of the time, and the east-west crosswind Runway 10/28 is used about 1% of the time.

2.2.2.4 DTW and CLE Runway Configurations

The existing runway configuration at DTW is used in the modeling. CLE is scheduled to construct a 960-foot runway extension to the southwest portion of Runway 06R/24L in 2007. The modeling for the year 2011 analysis incorporates the runway extension, which results in the following:

- Runway 24L arrivals will land 960 feet southwest of where they currently land;
- Runway 24L departures will start their takeoff roll 960 feet southwest from the current point;
- Runway 06R arrivals will continue to arrive at the current arrival point; and
- Runway 06R departures will continue with ground tracks similar to today; aircraft will turn where they are turning today, but will be at slightly higher in altitudes.

2.3 COMPARISON OF THE NO ACTION ALTERNATIVE AND PROPOSED ACTION ALTERNATIVE

Both the existing airspace structure (i.e., the No Action Alternative) and the Proposed Action use a system of fixes, routes, and procedures to direct aircraft through the CLE and D21 terminal airspace. ATC operates in a systematic manner such that all flights arriving or departing at CLE and DTW, and the associated satellite airports, are typically assigned to routes that are connected to the runway configurations in use at a given time. Due to changes in air travel demand characteristics (e.g., regional jets and new airline service between city pairs) and/or airport infrastructure improvements (e.g., new runways), these routings can become inefficient over time and must be reassessed to consider options for improved service.

Prescribed routes are used to ensure safe separation between aircraft that are traveling within an airspace sector and crossing sector and/or facility boundaries. In this way, aircraft are managed by ATC in a safe and predictable manner so that the controller in one sector or facility knows where to direct an aircraft to cross into an adjacent sector or facility. Similarly, a controller in an adjacent sector knows where to expect aircraft to enter their sector.

Flight routes for both the No Action Alternative and the Proposed Action Alternative are defined by a series of fixes or navigational aids (NAVAIDs) that comprise the route. NAVAIDs are radio stations that provide navigation aid to pilots. Fixes are defined navigational positions known to pilots and ATC that can be identified in reference to NAVAIDs. Typically, fixes have a 5-letter identifier while NAVAIDs have a 3-letter identifier. For the purposes of this discussion, routes are identified in reference to a single departure or arrival fix/NAVAID. **Appendix B** has additional information on fixes, NAVAIDs, sectors, and routes.

Changes to arrival and departure fixes in the terminal airspace, located anywhere from 10 to 50+ miles from a primary airport, are typically what differentiate a terminal airspace redesign project from an airport project involving runways, taxiways and/or gates.

Figures 2-1 through 2-8 provide a graphical comparison of the routes associated with No Action and Proposed Action alternatives. The figures provide a comparison of departure and arrival flows at DTW and CLE with both alternatives. The figures are intended to provide a conceptual view of the major, primarily jet routes. The solid flight track line on the graphics is the typical backbone route on which most flights would be concentrated, while the shaded areas represent the dispersion that occurs about the track by aircraft that are also on the same route. Section 2.3.1 provides text and a tabular summary of the jet routes in the No Action Alternative while Section 2.3.2 describes the route changes and rationale associated with the Proposed Action Alternative.

Appendix C contains a detailed description of the general routings for the No Action Alternative and Proposed Action Alternative. The location of fixes are depicted on **Figures 2-1 through 2-8** and are also identified in **Appendices A and C**.

2.3.1 No Action Alternative

The description of the existing airspace structure provides a generalized overview of the arrival and departure flows that comprise the primary ATC routings for aircraft operating to/from CLE and DTW. These general flow descriptions for the airspace/runway use configurations are provided as an overview as to how aircraft are directed into and out of the CLE and D21 terminal airspace.

2.3.1.1 No Action Alternative Routing Descriptions: Detroit Metropolitan Wayne County Airport

No Action Alternative: DTW/D21 Departures from Runways 04L, 04R, 03L and 03R, (Northeast Flow)

Figure 2-1 shows northeast flow departure routes from DTW for the No Action and the Proposed Action alternatives. Departures from Runways 04L, 04R, 03L, and 03R are routed via several nodal departure fixes located at the lateral boundaries of the D21 airspace:

- Departures towards the north and northeast are routed to the north via the LAYNE and PISTN departure fixes.
- Departures towards the northeast, east, and southeast are routed to the east via the HADAR, TYCOB or WINGS departure fixes.
- Departures towards the southeast, south, and southwest are routed to the south via the SCORR, CAVVS and ANNTS departure fixes, respectively.
- Departures towards the west, southwest, and northwest are routed to the west via the EARVN, HARWL, and DUNKS departure fixes.

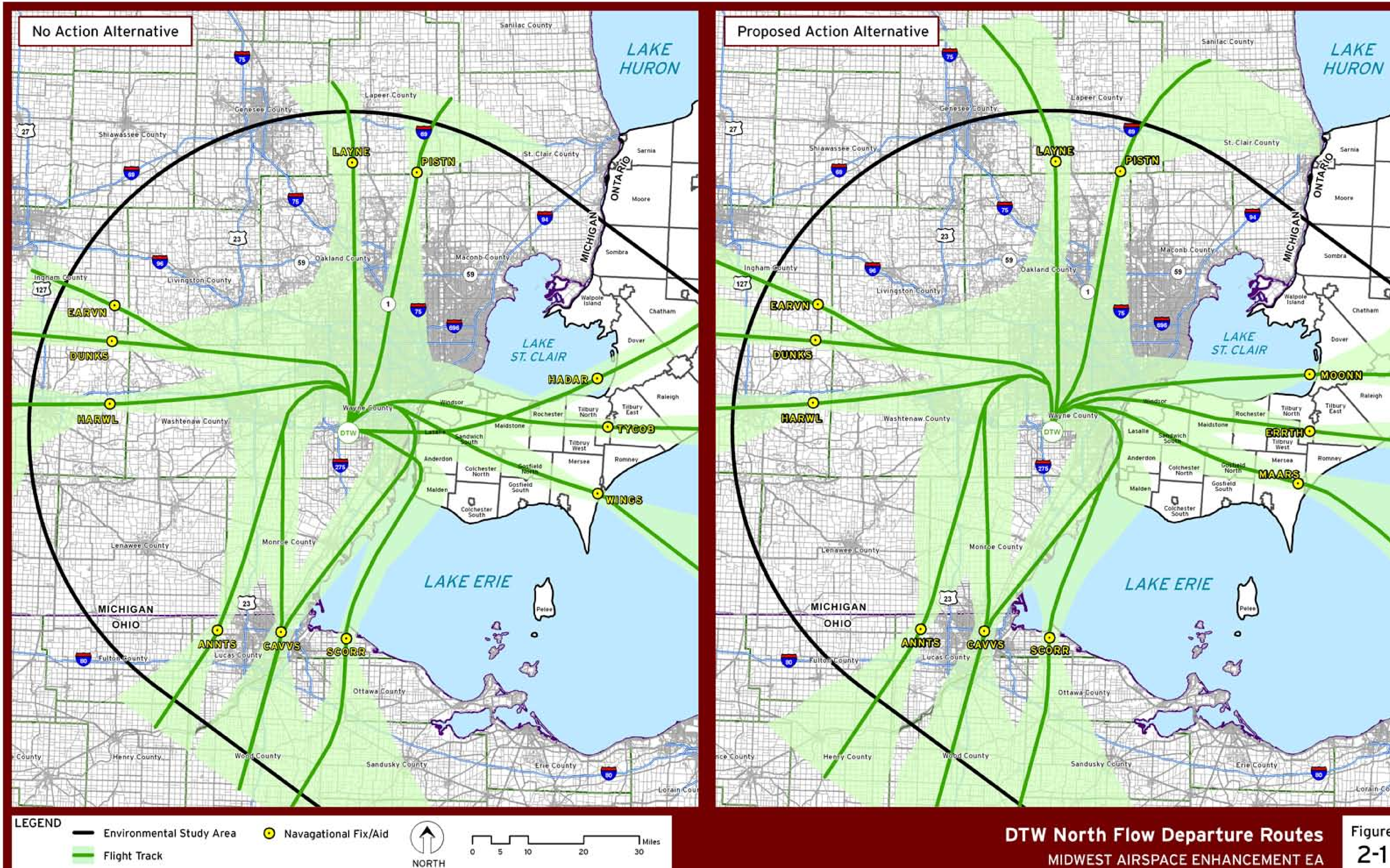
No Action Alternative: DTW/D21 Arrivals to Runways 04L, 04R, 03L and 03R (Northeast Flow)

Figure 2-2 shows northeast flow arrival routes for the No Action and the Proposed Action alternatives. Arrivals to Runways 04L, 04R, 03L, and 03R at DTW are routed via several nodal arrival fixes at the lateral boundaries of the D21 airspace:

- Arrivals from the east and northeast are routed via the SPICA arrival fix.
- Arrivals from the south and southeast are routed via the CETUS arrival fix.
- Arrivals from the southwest and west are routed via the MIZAR arrival fix.
- Arrivals from the north and northwest are routed via the POLAR arrival fix.

No Action Alternative: DTW/D21 Departures from Runways 22L, 22R, 21L and 21R (Southwest Flow)

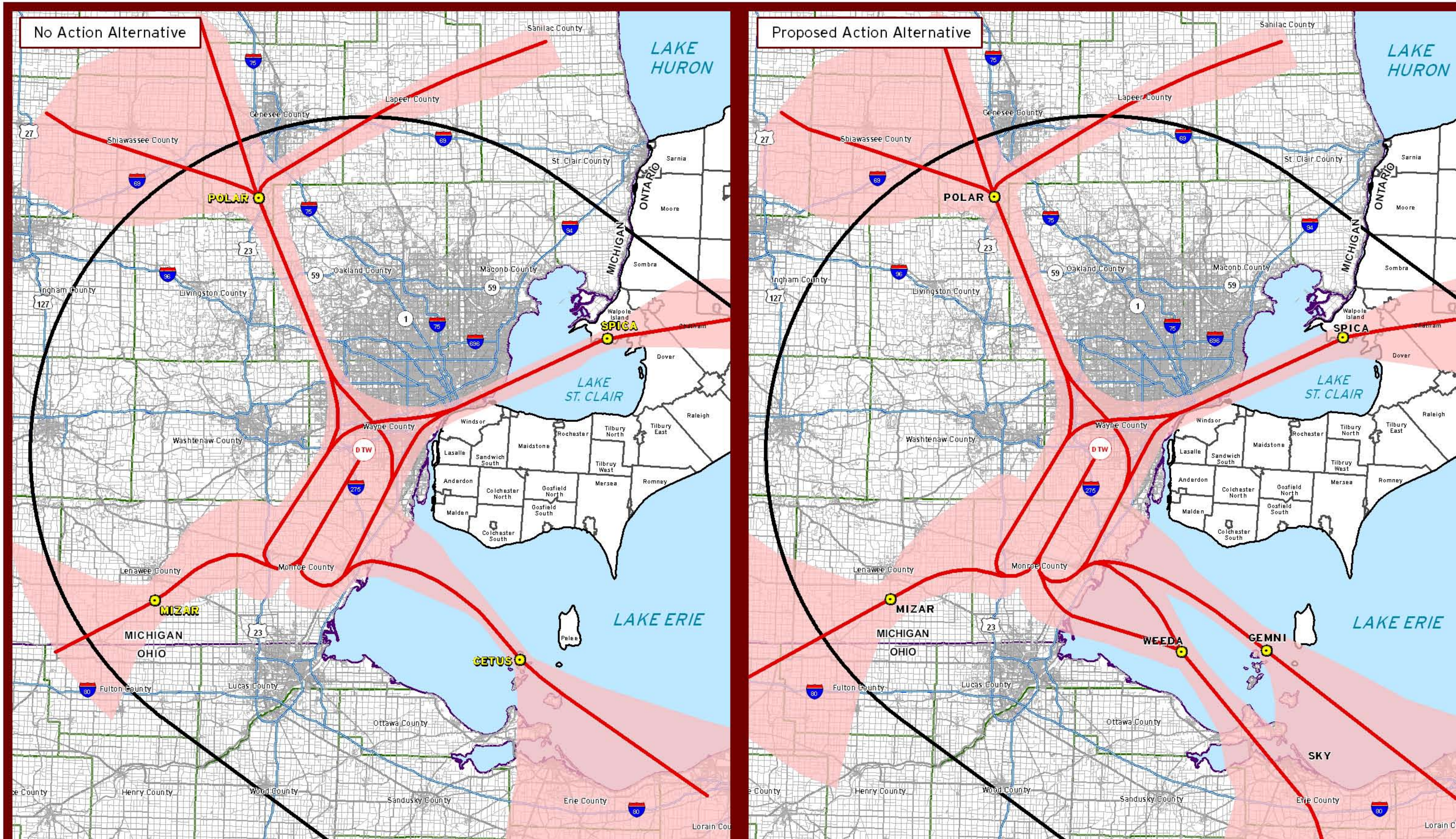
Figure 2-3 shows southwest flow departure routes for the No Action and the Proposed Action alternatives. Departures from Runways 22L, 22R, 21L, and 21R use the same departure fixes as those from Runways



DTW North Flow Departure Routes

MIDWEST AIRSPACE ENHANCEMENT EA

Figure 2-1



LEGEND
- Environmental Study Area
- Flight Track
- Navagational Fix/Aid

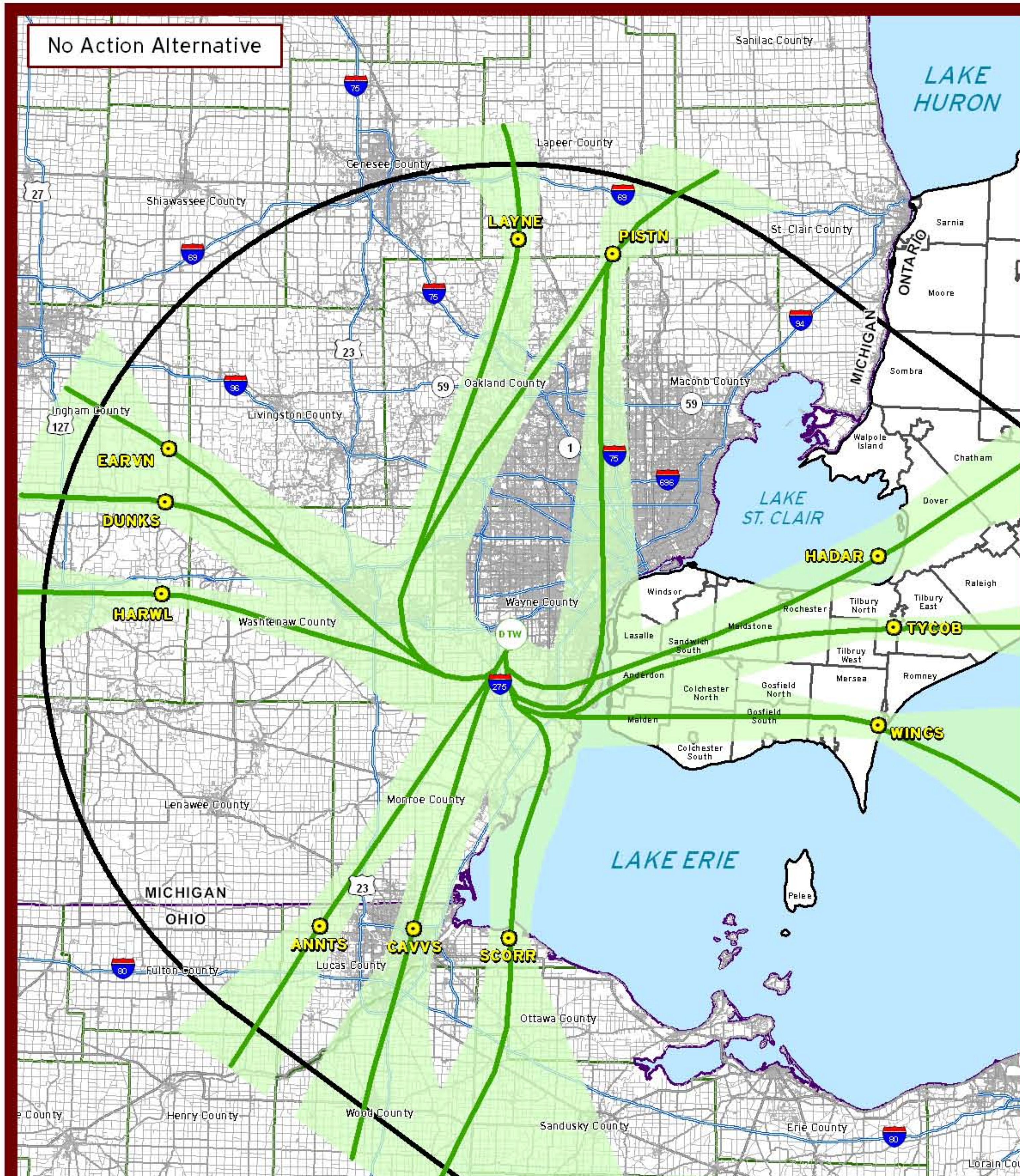
NORTH

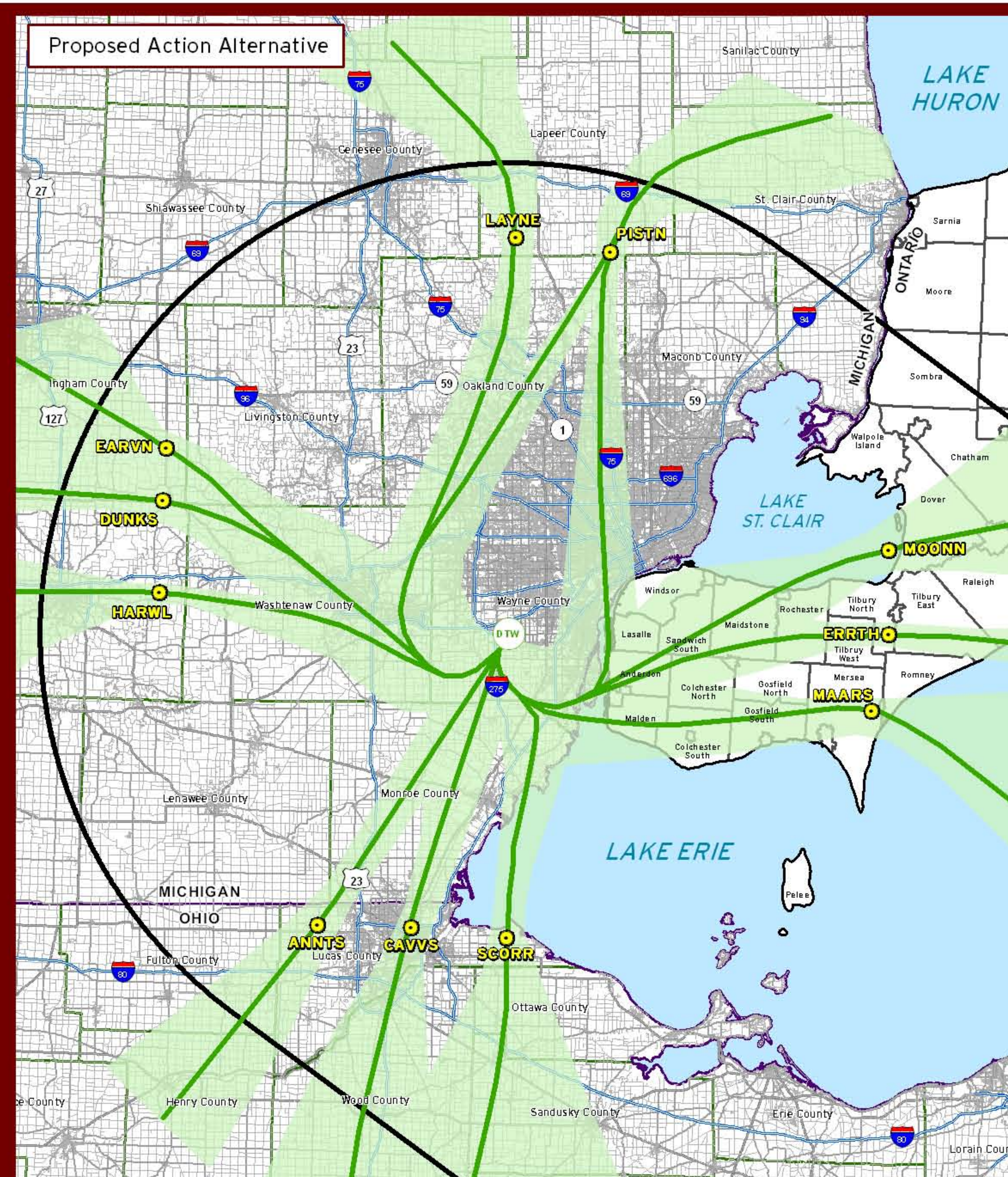
0 5 10 20 30 Miles

DTW North Flow Arrival Routes

MIDWEST AIRSPACE ENHANCEMENT EA

Figure 2-2





LEGEND
Environmental Study Area
Flight Track
Navagational Fix/Aid
NORTH
0 5 10 20 30 Miles

DTW South Flow Departure Routes

MIDWEST AIRSPACE ENHANCEMENT EA

Figure 2-3

04L, 04R, 03L, and 03R. However, there are some differences in how departures are routed to these common departure NAVAIDS/fixes in southwest flow versus northeast flow, as explained in **Appendix C**.

No Action Alternative: DTW/D21 Arrivals to Runways 22L, 22R, 21L and 21R (Southwest Flow)

Figure 2-4 shows southwest flow arrival routes for the No Action and the Proposed Action alternatives. Arrivals to Runways 22L, 22R, 21L, and 21R use the same arrival fixes as those to Runways 04L, 04R, 03L, and 03R. However, there are some differences in how arrivals are routed from these common arrival NAVAIDS/fixes to final approach in southwest flow versus northeast flow. These differences are explained in **Appendix C**.

2.3.1.2 No Action Alternative Routing Descriptions: Cleveland Hopkins International Airport

No Action Alternative: CLE Departures from Runways 06L and 06R (Northeast Flow)

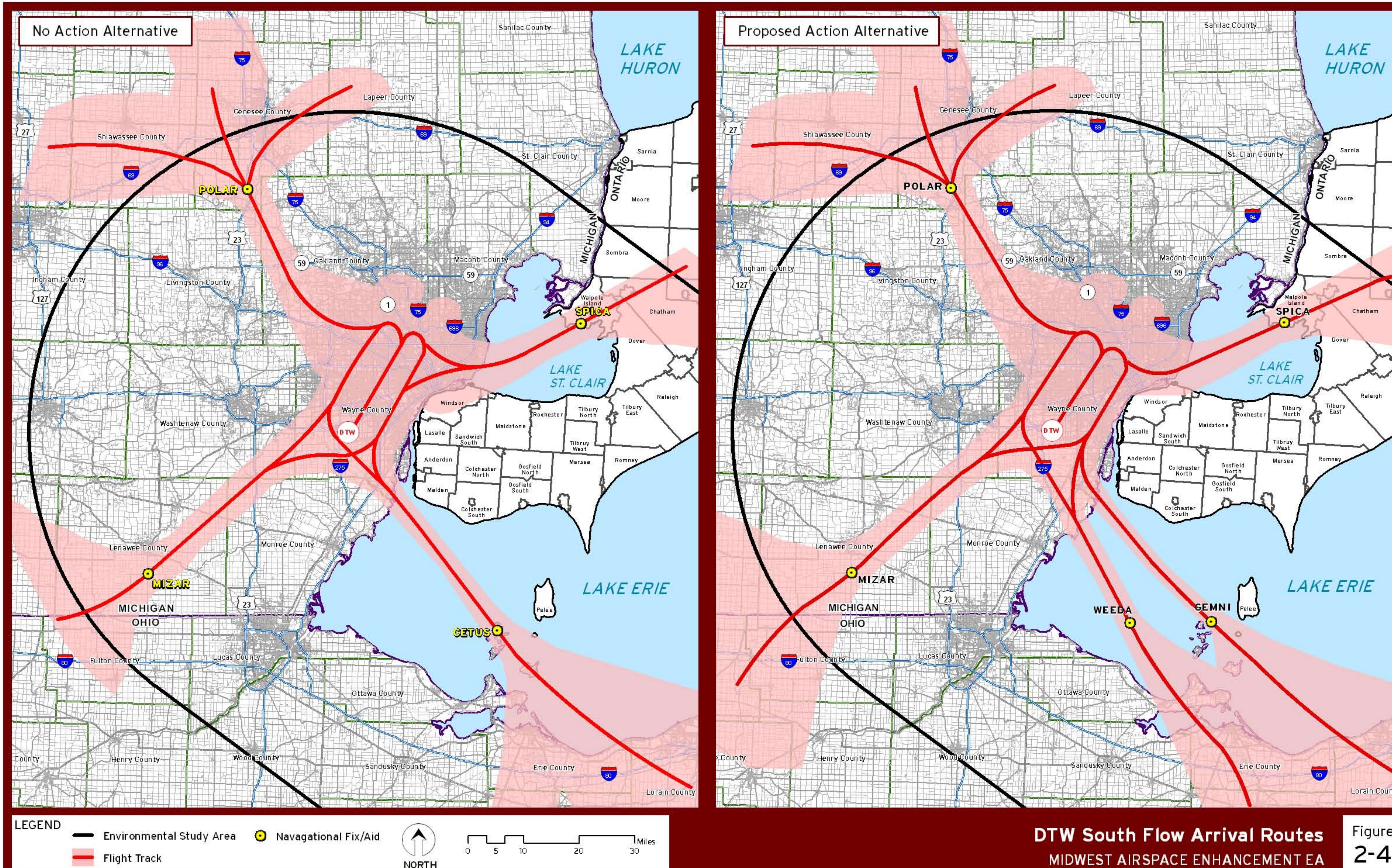
Figure 2-5 depicts northeast flow departure routes for the No Action and the Proposed Action alternatives. Departures from Runways 06L and 06R are routed via several nodal departure fixes located at the lateral boundaries of the CLE airspace:

- Departures to the north and northeast depart over the FAILS departure fix.
- Departures to the east and southeast depart over the Akron VOR/DME NAVAID (ACO).
- Departures to the southeast and south depart over the Appleton VORTAC NAVAID (APE).
- Departures to the southwest depart over the Mansfield VORTAC NAVAID (MFD).
- Departures to the west and northwest depart over the Sandusky VOR/DME NAVAID (SKY).
- Departures to airports in the Detroit area use the CETUS and JUNKR departures fixes.
- A limited number of mostly low-flights are routed via GILLS to destinations north and northwest of Detroit that are outside of DTW/D21 approach airspace.

No Action Alternative: CLE Arrivals to Runways 06L and 06R (Northeast Flow)

Figure 2-6 shows northeast flow arrival routes for the No Action and the Proposed Action alternatives. Arrivals to Runways 06L and 06R are routed via several nodal arrival fixes located at the lateral boundaries of the CLE airspace:

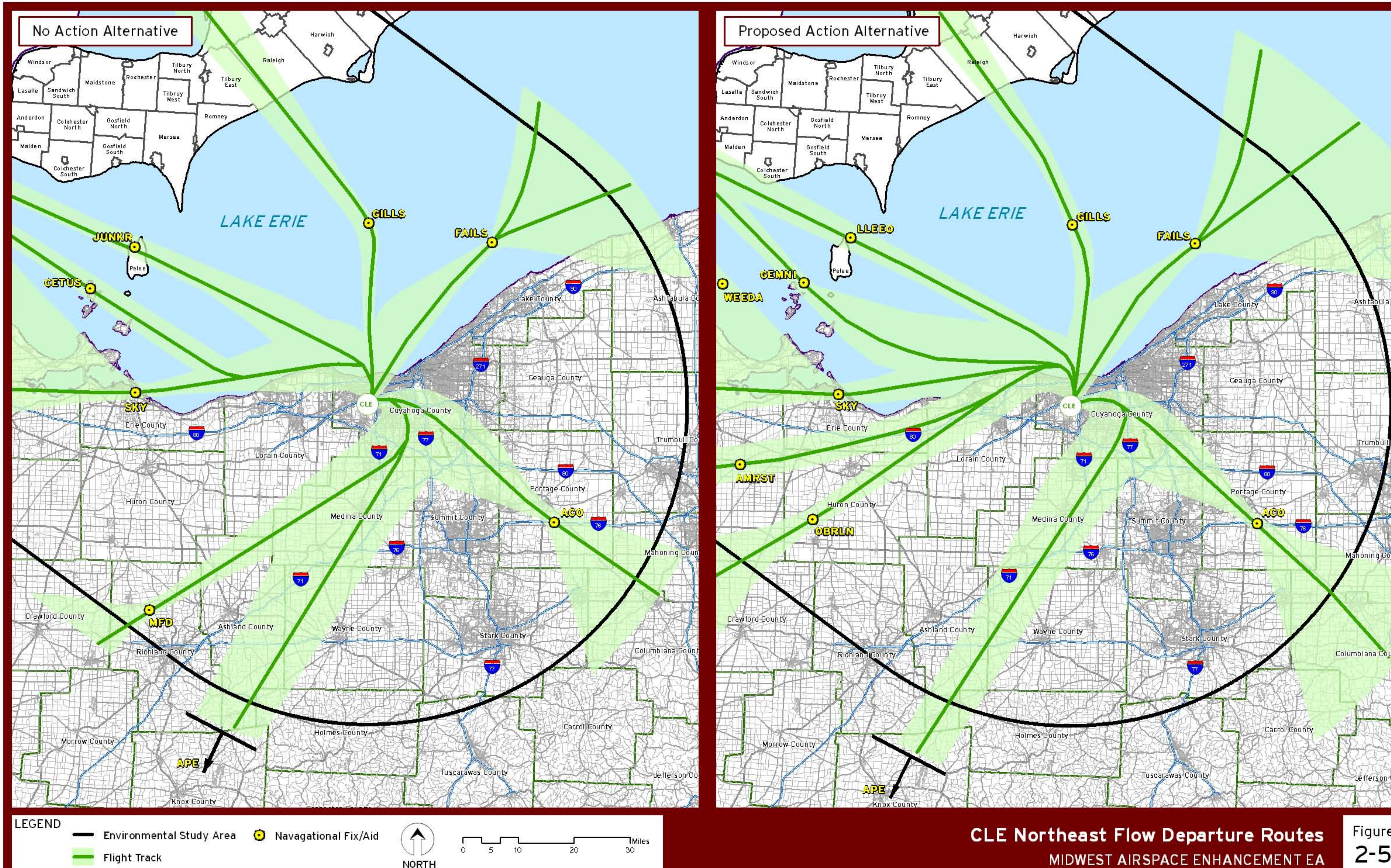
- Arrivals from the northwest and some from the northeast are routed via the GONNE arrival fix.
- Arrivals from the west are routed via the Waterville VOR/DME NAVAID (VWV) and travel further east over the WAKEM arrival fix for arrival into CLE.
- Arrivals from the east and northeast are routed via the Chardon VOR/DME NAVAID (CXR).
- Arrivals from the south and southeast are routed via the KEATN arrival fix.
- Arrivals from the south and southwest are routed via the Mansfield VORTAC NAVAID (MFD).



DTW South Flow Arrival Routes

MIDWEST AIRSPACE ENHANCEMENT EA

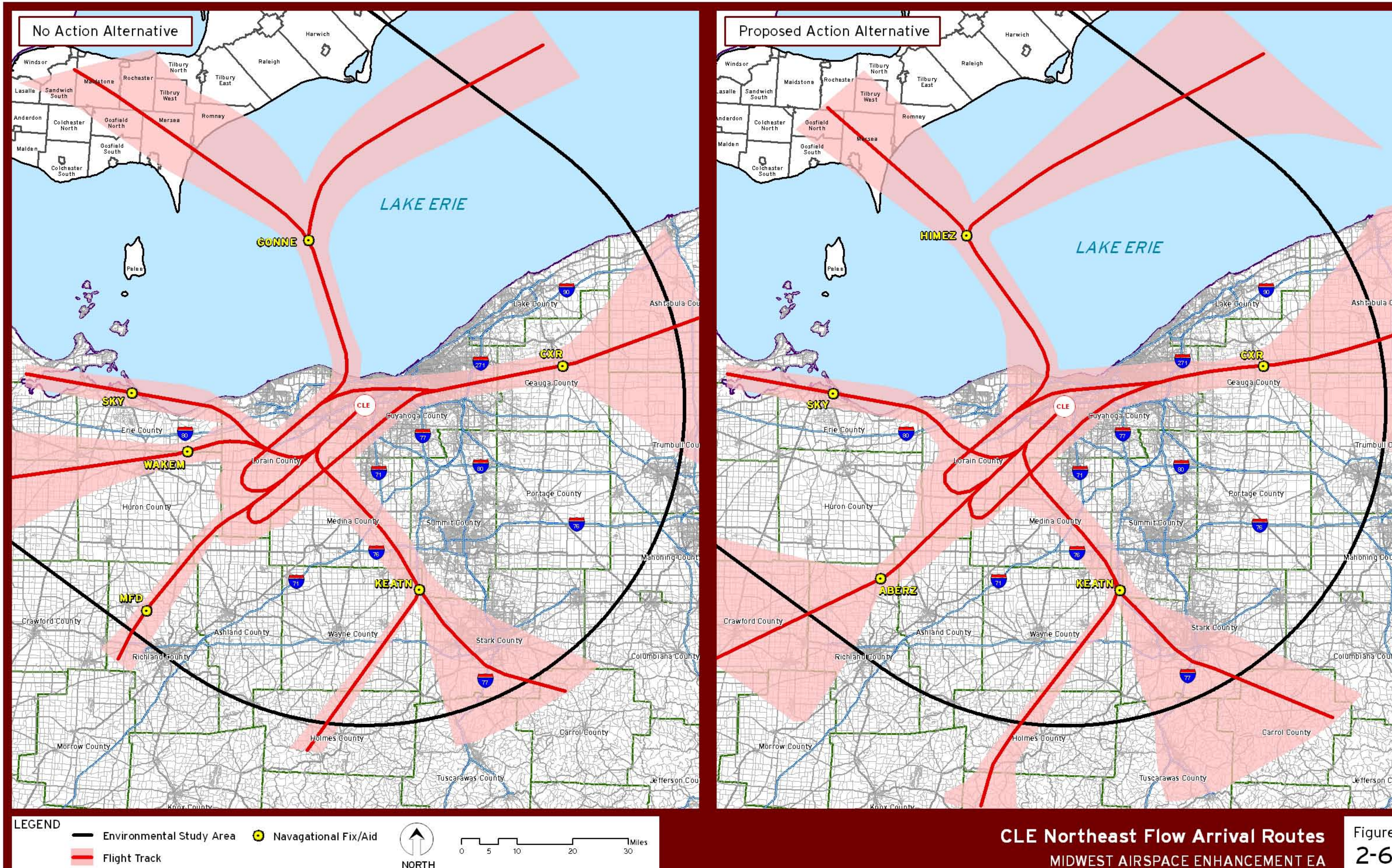
Figure 2-4



CLE Northeast Flow Departure Routes

MIDWEST AIRSPACE ENHANCEMENT EA

Figure 2-5



CLE Northeast Flow Arrival Routes

MIDWEST AIRSPACE ENHANCEMENT EA

Figure 2-6

- Arrivals from the southwest and west are routed via the WAKEM arrival fix.

No Action Alternative: CLE Departures from Runways 24L and 24R (Southwest Flow)

Figure 2-7 shows southwest flow departure routes for the No Action and the Proposed Action alternatives. Departures from Runways 24L and 24R use the same departure fixes as those from Runways 06L and 06R. However, there are some differences in how departures are routed to these common departure NAVAIDS/fixes in southwest flow versus northeast flow, as explained in **Appendix C**.

No Action Alternative: CLE Arrivals to Runways 24L and 24R (Southwest Flow)

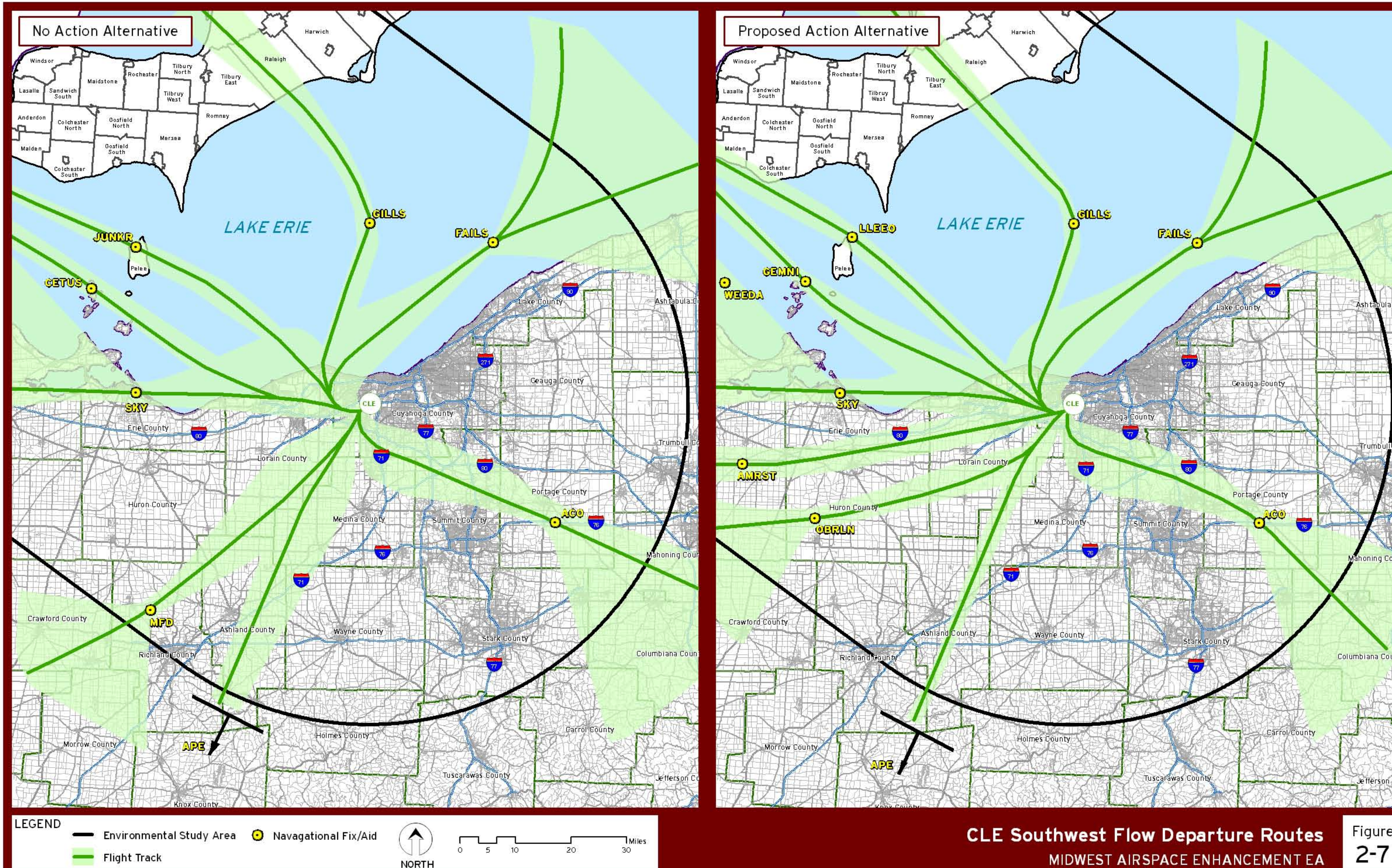
Figure 2-8 shows southwest flow arrival routes for the No Action and the Proposed Action alternatives. Arrivals to Runways 24L and 24R use the same arrival fixes as those to Runways 06L and 06R. However, there are some differences in how arrivals are routed from these common arrival NAVAIDS/fixes to final approach in southwest flow versus northeast flow. These differences are explained in **Appendix C**.

2.3.2 MASE Airspace Redesign (Proposed Action and Preferred Alternative)

The MASE Airspace Redesign is the Proposed Action and Preferred Alternative being considered in this EA. The Proposed Action offers the potential to improve the operational efficiency and safety in the airspace overlying the CLE and D21 terminal airspace environments, as well as to integrate the high-altitude en route airspace with the low-altitude terminal airspace to provide a more seamless operation between TRACON and center airspace. In addition, the MASE project would allow for more efficient utilization of the runways at CLE and DTW.

Table 2-1 lists the objectives and assumptions used by the airspace redesign team in the development of the MASE Airspace Redesign. As discussed in Section 2.2.1.4, the Airspace Design Team evaluated numerous design iterations for effectiveness, efficiency, and constraints. The design process did not involve the development of several wholly integrated design plans. Rather, the design process considered the feasibility of individual initiatives to address specific deficiencies in the terminal and en route airspace environments. Individual initiatives were abandoned or adopted based on their relative merits towards meeting the project’s purpose and need and the preferences of ATC facilities for managing the air traffic within their airspace. As a result of this process, a single wholly integrated airspace redesign was developed that is a balanced, composite design for an improved airspace structure.

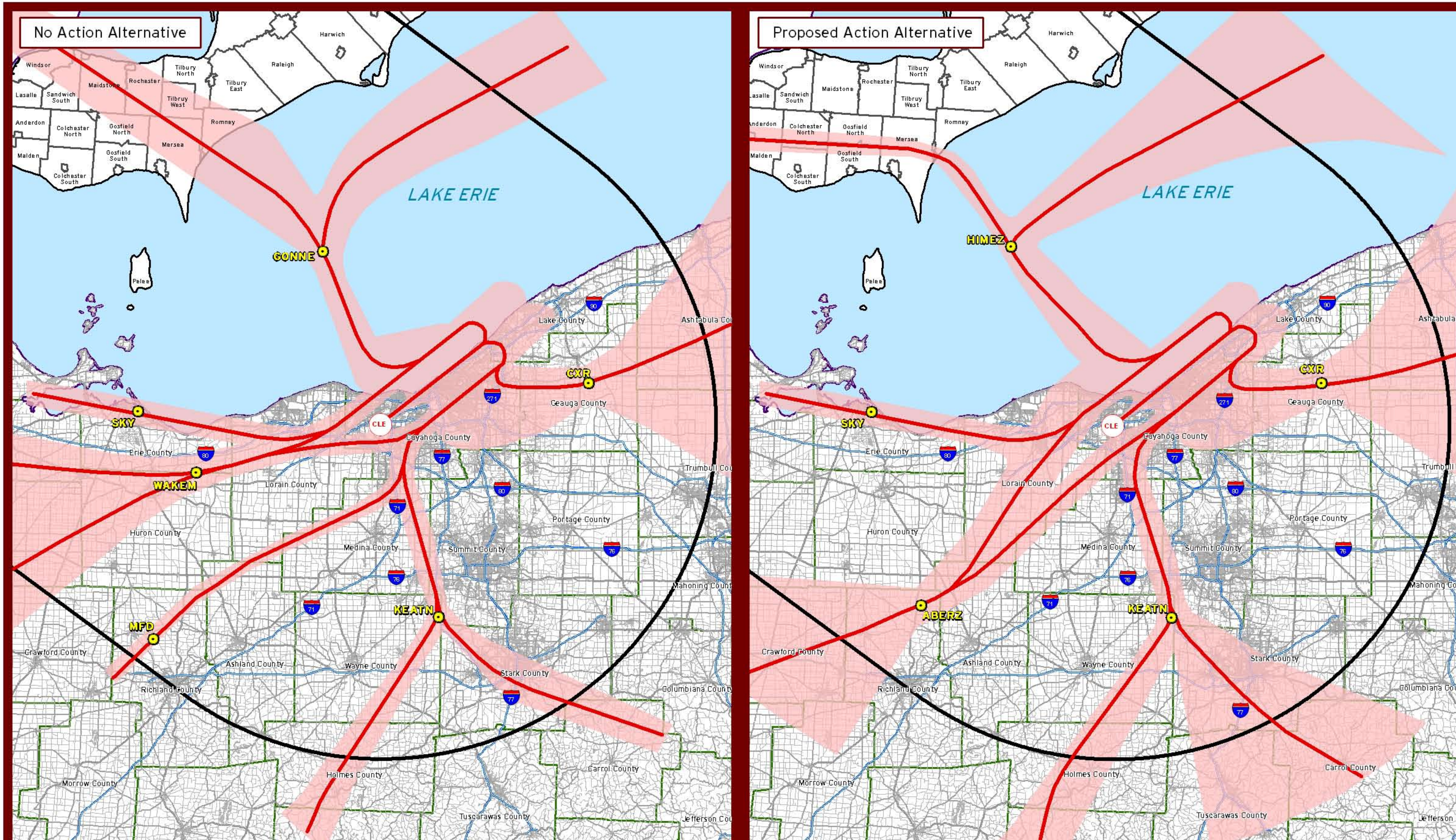
The following sections describe the routing changes for the Proposed Action as compared to the existing routings in the No Action Alternative. The information in this section focuses on changes to routes used by jet aircraft operating to/from CLE and/or DTW. Additional information on the routings for both the No Action Alternative and the Proposed Action Alternative, including design elements that are common to both, is included in **Appendix C**.



CLE Southwest Flow Departure Routes

MIDWEST AIRSPACE ENHANCEMENT EA

Figure 2-7



LEGEND

Environmental Study Area

Flight Track

Navagational Fix/Aid

NORTH

0 5 10 20 30 Miles

CLE Southwest Flow Arrival Routes

MIDWEST AIRSPACE ENHANCEMENT EA

Figure 2-8

Table 2-1

Airspace Design Objectives and Assumptions

Objectives

- Reduce complexity and congestion in terminal and en route airspace
- Shorten routes
- Segregate routes for aircraft of dissimilar operating characteristics
- Impose fewer altitude restrictions on climbing departure aircraft
- Allow aircraft to operate at higher, more fuel efficient altitudes for longer periods
- Create flexible airspace structure
- Accommodate projected growth

Assumptions

- Multiple radar sites will provide radar coverage for the airspace design changes
- Maintain present-day restricted and prohibited areas
- Maintain published noise abatement procedures or initial departure/final arrival procedures

Source: Airspace Design Team

2.3.2.1 Proposed Action Routing Descriptions: Detroit Metropolitan Wayne County Airport

Proposed Action: DTW/D21 Departures

Figures 2-1 and 2-3 depict and **Table 2-2** describes the jet route changes for DTW departures, by NAVAID/fix, in the Proposed Action versus the No Action Alternative. Text descriptions of the changes are also included in this section.

<u>Proposed Action: DTW/D21 departures to HADAR, TYCOB and WINGS (East)</u>

Changes Proposed: In the Proposed Action, ERRTH replaces TYCOB, MARRS replaces WINGS, and MOONN replaces HADAR (which is a satellite arrival fix and sometimes used today for DTW and satellite airport low altitude propeller aircraft departures). As shown in **Table 2-2**, the change is needed for appropriate departure fix spacing; i.e., the new fixes provide for adjustments in the location of the routes in order to maintain the proper lateral separation between aircraft.

<u>Proposed Action: DTW/D21 departures to SCORR, CAVVS and ANNTS (South)</u>

Changes Proposed: The SCORR fix is the primary turboprop and propeller route used for this configuration today; with the Proposed Action, jet traffic would also use SCORR.

<u>Proposed Action: DTW/D21 departures to HARWL, DUNKS and EARVN (West)</u>

Changes Proposed: In the Proposed Action, routings to MSP, MKE, GRR, and GRB move from DUNKS to EARVN and consist of lower altitude tower en route traffic.

<u>Proposed Action: DTW/D21 departures to LAYNE and PISTN (North)</u>

No Changes Proposed.

Table 2-2

DTW/D21 Departure Routes - No Action Alternative versus Proposed Action Alternative

Departure NAVAID/Fix (Direction)	No Action Alternative NAVAID/Fix	Proposed Action NAVAID/Fix	Changes Between No Action Alternative and Proposed Action Alternative
HADAR (East)	Existing	Fix Replaced	HADAR replaced by MOONN in MASE; allows for appropriate departure fix spacing.
MOONN (East)	Not Applicable (New MASE Fix)	New Fix	MOONN replaces HADAR in MASE and is used as a major jet departure route; allows for appropriate departure fix spacing.
TYCOB (East)	Existing	Fix Replaced	TYCOB replaced by ERRTH in MASE; allows for appropriate departure fix spacing.
ERRTH (East)	Not Applicable (New MASE Fix)	New Fix	ERRTH replaces TYCOB in MASE; allows for appropriate departure fix spacing.
WINGS (East)	Existing	Fix Replaced	WINGS replaced by MARRS in MASE; allows for appropriate departure fix spacing.
MARRS (East)	Not Applicable (New MASE Fix)	New Fix	MARRS replaces WINGS in MASE; allows for appropriate departure fix spacing.
ANNTS (South)	Existing	No Change	
CAVVS (South)	Existing	No Change	
SCORR (South)	Existing	Different fix use	SCORR fix would also be used for jet departures in MASE.
EARVN (West)	Existing	Different fix use	Tower en route traffic to MSP, MKE, GRR, and GRB that is currently routed to DUNKS would be moved to EARVN in MASE.
DUNKS (West)	Existing	Different fix use	Tower en route traffic would be moved from DUNKS to EARVN.
HARWL (West)	Existing	No Change	
LAYNE (North)	Existing	No Change	
PISTN (North)	Existing	No Change	

Note: No Action Alternative and Proposed Action Alternative comparative routing depictions for DTW northeast and southwest flow departure operations can be found in **Figures 2-1 and 2-3**, respectively.

Source: NGIT analysis.

Proposed Action: DTW/D21 Arrivals

Figures 2-2 and 2-4 and **Table 2-3** depict the major jet route changes for DTW arrivals, by NAVAID/fix, in the Proposed Action versus the No Action Alternative. Text descriptions of the changes are also included in this section.

Proposed Action: DTW/D21 Arrivals to SPICA (Northeast)

Changes Proposed: Some traffic going to CETUS in the No Action Alternative would instead be routed via SPICA in the Proposed Action.

Proposed Action: DTW/D21 Arrivals to CETUS (Southeast)

Changes Proposed: CETUS is replaced by GEMNI, and the new arrival fix WEEDA is added further south and west of GEMNI in the Proposed Action. Traffic currently routed to CETUS would be routed split between the new GEMNI and WEEDA arrival fixes. Additionally, some traffic going to CETUS in the No Action Alternative would instead be routed via SPICA in the Proposed Action.

Proposed Action: DTW/D21 Arrivals to MIZAR (Southwest)

Changes Proposed: Changes are planned from the No Action Alternative to the Proposed Action Alternative in that some MIZAR traffic would be moved to WEEDA.

Proposed Action: DTW/D21 Arrivals to POLAR (Northwest)

No Changes Proposed.

Table 2-3

DTW/D21 Arrival Routes - No Action Alternative versus Proposed Action Alternative

Arrival NAVAID/Fix (Direction)	**No Action Alternative NAVAID/Fix**	**Proposed Action NAVAID/Fix**	**Changes Between No Action Alternative and Proposed Action Alternative**
SPICA (Northeast)	Existing	Minor Change	Some CETUS traffic moved to SPICA.
PICES (Northeast)	Not Applicable (New MASE Fix)	New Fix	DTW satellite arrival traffic that is currently routed to HADAR would go to PICES in MASE.
HADAR (East)	Existing	Fix replaced	DTW satellite arrival traffic that is currently routed to HADAR would go to PICES in MASE.
CETUS (Southeast)	Existing	Fix Replaced	GEMNI fix replaces CETUS fix in MASE.
GEMNI (Southeast)	Not Applicable (New MASE Fix)	New Fix	GEMNI fix is a replacement for CETUS making room for additional SE arrival fix WEEDA.

Table 2-3

DTW/D21 Arrival Routes - No Action Alternative versus Proposed Action Alternative

Arrival NAVAID/Fix (Direction)	No Action Alternative NAVAID/Fix	Proposed Action NAVAID/Fix	Changes Between No Action Alternative and Proposed Action Alternative
WEEDA (Southeast)	Not Applicable (New MASE Fix)	New Fix	Additional SE arrival fix increases DTW/D21 ability to accept arrivals; traffic to CETUS would be split between WEEDA and GEMNI. WEEDA would also take some traffic that is currently routed to MIZAR.
MIZAR (Southwest)	Existing	Minor Change	Some MIZAR traffic moved to WEEDA.
POLAR (Northwest)	Existing	No Change	

Note: No Action Alternative and Proposed Action Alternative comparative routing depictions for DTW/D21 northeast and southwest flow arrival operations can be found in **Figures 2-2 and 2-4**, respectively.

Source: NGIT analysis.

2.3.2.2 Proposed Action Routing Descriptions: Cleveland Hopkins International Airport

Proposed Action: CLE Departures

Figures 2-5 and 2-7 depict and **Table 2-4** describes the jet route changes for CLE departures, by NAVAID/fix, in the Proposed Action versus the No Action Alternative. Text descriptions of the changes are also included in this section.

<u>Proposed Action: CLE Departures to GILLS (North)</u>

Minor Change Proposed. Some CLE satellite flights would move from GILLS to LLEEO in MASE.

<u>Proposed Action: CLE Departures to FAILS (Northeast)</u>

No Changes Proposed.

<u>Proposed Action: CLE Departures to ACO (Southeast)</u>

No Changes Proposed.

<u>Proposed Action: CLE Departures to APE (South)</u>

No Changes Proposed.

<u>Proposed Action: CLE Departures to MFD (Southwest)</u>

Changes Proposed: Flights currently routed via MFD would instead go to the OBRLN and ARMST in the Proposed Action. MFD would no longer be used for departures.

<u>Proposed Action: CLE Departures to SKY (West)</u>

Changes Proposed: Nearly all CLE departures that go to SKY in the No Action Alternative would be moved to AMRST. After AMRST, these flights are then routed via VWV to the west, via the new ALPHE1 departure procedure to the northwest, or via CRL to the northwest. The few CLE departures that would still be routed via SKY are low-altitude flights via CHOOT to Toledo, OH and other destinations in lower Michigan that are outside DTW/D21 arrival airspace.

Proposed Action: CLE Departures to CETUS and JUNKR (Northwest)

Changes Proposed: The CETUS and JUNKER departures (which land DTW & its satellites) become GEMNI and LLEEO. As shown in **Table 2-4**, the change is needed for appropriate departure fix spacing; i.e., the new fixes provide for adjustments in the location of the routes in order to maintain the proper lateral separation between aircraft.

Table 2-4

CLE Departure Routes - No Action Alternative versus Proposed Action Alternative

Departure NAVAID/Fix (Direction)	**No Action Alternative NAVAID/Fix**	**Proposed Action NAVAID/Fix**	**Changes Between No Action Alternative and Proposed Action Alternative**
GILLS (North)	Existing	Minor change	Some CLE satellite flights would move from GILLS to LLEEO in MASE.
FAILS (Northeast)	Existing	No Change	
ACO (Southeast)	Existing	No Change	
APE (South)	Existing	No Change	
MFD (Southwest)	Existing (used by higher altitude departures)	NAVAID use replaced	MFD would no longer be used for departures, which would be routed to OBRLN and ARMST in the Proposed Action. The airspace around MFD would instead be used by arrivals routed via the new ABERZ arrival fix as the SW arrival point (See Table 2-5).
ARMST (Southwest)	Not Applicable (New MASE Fix)	New fix	New southwest and west departure fix replaces MFD departure fix; in conjunction with OBRLN fix it provides 2 departure points to manage CLE departures during periods of high departure demand. Departures routed via SKY to VWV would instead by routed via ARMST to VWV.
OBRLN (Southwest)	Not Applicable (New MASE Fix)	New fix	New southwest and west departure fix replaces MFD departure fix; in conjunction with AMRST fix it provides 2 departure points to manage CLE departures during periods of high departure demand.
SKY (West)	Existing	Different fix use	Nearly all flights to SKY would be moved to AMRST, and then to VWV, ALPHE1, or CRL. A few CLE departures would still be routed via SKY if on low-altitude flights to Toledo, OH and other destinations in lower Michigan that are outside DTW/D21 arrival airspace.

Table 2-4

CLE Departure Routes - No Action Alternative versus Proposed Action Alternative

Departure NAVAID/Fix (Direction)	**No Action Alternative NAVAID/Fix**	**Proposed Action NAVAID/Fix**	**Changes Between No Action Alternative and Proposed Action Alternative**
CETUS/JUNKR (Northwest)	Existing	Fixes Replaced	Small geographical shift of these northwest departure fixes towards the northeast (CETUS to GEMNI is 2.25 miles, JUNKR to LLEEO is 2.85 miles) in MASE; allows for appropriate departure fix spacing.
GEMNI/LLEEO (Northwest)	Not Applicable (New MASE Fixes)	New fixes	Small geographical shift of these northwest departure fixes towards the northeast (CETUS to GEMNI, 2.25 miles) and (JUNKR to LLEEO 2.85 miles) in MASE; allows for appropriate departure fix spacing.

Note: No Action Alternative and Proposed Action Alternative comparative routing depictions for CLE northeast and southwest flow departure operations can be found in **Figures 2-5 and 2-7**, respectively.

Source: NGIT analysis.

Proposed Action: CLE Arrivals

Figures 2-6 and 2-8 depict and **Table 2-5** describes the jet route changes for CLE arrivals, by NAVAID/fix, in the Proposed Action versus the No Action Alternative. Text descriptions of the changes are also included in this section.

<u>Proposed Action: CLE Arrivals from GONNE (North)</u>

Changes Proposed: CLE arrivals from the northwest north and northeast that presently arrive via the GONNE arrival fix would be shifted further west (approximately 8 miles) to the HIMEZ fix in the Proposed Action. Approximately 60% of the VWV arrivals that are presently routed via the WAKEM arrival fix would instead be routed via HIMEZ. The remaining 40% of the VWV-WAKEM CLE arrivals would be routed via the new ABERZ arrival fix.

<u>Proposed Action: CLE Arrivals from MFD (Southwest)</u>

Changes Proposed: In the No Action Alternative, MFD is primarily a heavily used higher altitude departure fix. This would no longer be possible in the Proposed Action due to the establishment of the new ABERZ arrival fix. MFD is also used in the No Action Alternative by a relatively small number of low altitude arrivals; these flights would instead be routed via ABERZ. MFD would no longer be used as an arrival fix.

<u>Proposed Action: CLE Arrivals from CXR (East)</u>

No Changes Proposed.

<u>Proposed Action: CLE Arrivals from KEATN (South)</u>

No Changes Proposed.

Table 2-5

CLE Arrival Routes - No Action Alternative versus Proposed Action Alternative

Arrival NAVAID/Fix (Direction)	No Action Alternative NAVAID/Fix	Proposed Action NAVAID/Fix	Changes Between No Action Alternative and Proposed Action Alternative
GONNE (Northwest)	Existing	Fix replaced	GONNE fix effectively replaced by HIMEZ and ABERZ fixes in MASE
HIMEZ (Northwest)	Not Applicable (New MASE Fix)	New Fix	HIMEZ fix effectively replaces GONNE fix in MASE. Existing VWV-WAKEM arrivals (60% of WAKEM traffic) would be routed to HIMEZ.
CXR (East)	Existing	No Change	
KEATN (Southeast)	Existing	No Change	
MFD (Southwest)	Existing (used by low altitude arrivals)	NAVAID use replaced	MFD currently used by small number of low altitude arrivals. MFD effectively replaced in MASE as SW arrival point by new ABERZ
ABERZ (Southwest)	Not Applicable (New MASE Fix)	New Fix	ABERZ arrival fix effectively replaces MFD (existing low altitude SW arrival point) as the new SW arrival fix in MASE. Existing ROD-WAKEM arrivals (40% of WAKEM traffic) would be routed to ABERZ.
WAKEM (West)	Existing	NAVAID-Fix use Replaced	WAKEM arrival route is effectively abandoned in MASE to make room for the new ARMST and OBRLN departure fixes. WAKEM traffic would be routed to HIMEZ and ABERZ in MASE.

Note: No Action Alternative and Proposed Action Alternative comparative routing depictions for CLE northeast and southwest flow arrival operations can be found in **Figures 2-6 and 2-8**, respectively.

Source: NGIT analysis.

Proposed Action: CLE Arrivals from WAKEM (West)

Changes Proposed: CLE arrivals from the west that are presently routed via the WAKEM fix would be routed via the new HIMEZ or ABERZ fixes in the Proposed Action. Flights that are currently routed via the VWV-WAKEM transition (approximately 60% of total WAKEM arrivals) would be routed over HIMEZ, while the ROD-WAKEM transition flights (remaining 40% of WAKEM arrivals) would be routed over ABERZ. The WAKEM arrival fix would effectively be abandoned to free-up airspace for the new ARMST and OBRLN departure fixes.

2.3.2.3 CLE/DTW Satellite Airport Airspace Redesign

A number of satellite airports were assessed for determining environmental impacts in this EA. A total of 15 airports were included in the noise modeling. These 15 airports have an average of 10 or more daily IFR operations and thus have the potential to be affected by the Proposed Action.

Based on satellite airport routing analysis and validation by CLE, DTW, and D21 ATC personnel, it was determined that 10 of the 15 assessed airports would be slightly affected by the Proposed Action. This means that some aspect of MASE routings would affect how aircraft are routed to/from these airports when compared to the No Action Alternative. Detailed descriptions of routing changes between the No Action Alternative and the Proposed Action Alternative can be found in **Appendix C**. The airports that would be slightly affected include the following:

- Cleveland Burke Lakefront Airport (BKL)
- Cuyahoga County Airport (CGF)
- Akron/Canton Regional Airport (CAK)
- Windsor Airport, Ontario, Canada (CYQG)
- Detroit City Airport (DET)
- Bishop International Airport (FNT)
- Oakland County International Airport (PTK)
- Toledo Express Airport (TOL)
- Willow Run Airport (YIP)
- Ann Arbor Municipal Airport (ARB)

2.4 SUMMARY COMPARISON OF REASONABLE ALTERNATIVES

Both the No Action Alternative and the Proposed Action Alternative are carried forward for detailed environmental analyses.

The existing congestion problems between the terminal and en route airspace environments would not be addressed in the No Action Alternative. Unless the current congestion problems are addressed, delay and ATC workload issues will be exacerbated as traffic volume continues to increase in the future. Additionally, more efficient use of the new runway development at CLE (including the planned extension of Runway 06R/24L) and DTW could not be achieved due to the existing limitations of the terminal and en route airspace configurations in the No Action Alternative.

The Proposed Action would enable the CLE and D21 TRACONS, and ZOB and ZID Centers, to implement an airspace redesign solution that addresses the congestion issues between the terminal and en route airspace environments. In addition, the multi-center reroute solutions in the MASE airspace redesign would permit other centers to be aligned with the overall flow of traffic in the CLE, D21, ZOB airspace environments. This would effectively improve the integration and flow of ATC routings east of the Mississippi River, thereby enhancing the safe, orderly and expeditious movement of flight operations in this vital component of the NAS.

NOTES

1 See http://api.hq.faa.gov/lga/index.htm.

2 Order Limiting Scheduled Operations at O'Hare International Airport, Docket No. FAA-2004-16944-1, U.S. DOT/FAA, 23 January 2005.

3 As codified in 49 USC 41715.

4 Order Limiting Scheduled Operations at O'Hare International Airport, Docket No. FAA-2004-16944-1, U.S. DOT/FAA, 23 January 2005, pp. 2.

5 See http://www.faa.gov/programs/oep/.